

Notice of Allowability

Application No.

10/773,821

Applicant(s)

SCHRAVENDIJK ET AL.

Examiner

Art Unit

Jennifer M. Dolan

2813

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 10/19/05.
2. ☒ The allowed claim(s) is/are 1-8, 10-22.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.


Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 11/18/05
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/19/05 has been entered.

Allowable Subject Matter

2. Claims 1-8 and 10-22 are allowed.

3. The following is an examiner's statement of reasons for allowance:

The primary reason for allowance is the combination of using the specified oxygen gas precursors, obtaining the required amount of oxygen (or using the required flow ratio of oxygen for claim 20), and specifically excluding the presence of nitrogen when providing the dual damascene antireflective layer.

The closest prior art of record does teach each of the individual claimed elements. For example, U.S. Patent No. 6,316,167 to Angelopoulos et al. (cited in a prior office action) discloses forming a SiOC layer having an oxygen content overlapping the claimed range. It does not, however, use one of the claimed precursors, but rather uses elemental oxygen at a low flow rate relative to the flow rate of the silicon precursor.

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U.S. Patent Publication No. 2002/0155386 to Xu et al. (cited in a prior office action) would appear, on the surface, to obviate the claimed invention by teaching the formation of SiOC layers by using a carbon oxide precursor for the oxygen in combination with a silane precursor. The oxygen source flow rates disclosed by Xu are very small, however, and would not have the flow rate ratio claimed in claim 20 or the required oxygen composition for claims 1 and 6. Since a carbon oxide precursor acts as a source of both carbon and oxygen, thus necessitating a very large flow rate relative to the silane flow rate in order to achieve a high oxygen content in the claimed range, and since both Angelopoulos and Xu are generally suggestive of low oxygen contents, it is the Examiner's opinion that it would not be particularly reasonable to use the precursor gases of Xu, and then drastically increase the carbon oxide flow rate such that a high oxygen content SiOC layer, taught by Angelopoulos as being less preferred, would result.

Furthermore, while Xu and Angelopoulos use specific examples excluding the presence of nitrogen, none of the prior art references of record provide any motivation for the exclusion of nitrogen from the anti-reflective layer, and in fact, these cited references suggest the inclusion of nitrogen as a viable option for the layer. Since the specific combination of the claimed source gases, the exclusion of the presence of nitrogen, and the relatively high oxygen content for ARLs applied to a dual damascene structure result in an antireflective layer that prevents resist poisoning problems while allowing for tunability of the refractive index and extinction coefficient, it is the Examiner's opinion that this combination would only have been apparent to a person skilled in the art through impermissible hindsight.

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Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Dolan whose telephone number is (571) 272-1690. The examiner can normally be reached on Monday-Friday 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W. Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jennifer M. Dolan
Examiner
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